

---

# Strategic research priorities for Hybrid Systems



Wolfram Sparber, EURAC research - Italy  
Vice President RHC ETP  
Annual Conference, Copenhagen 2012

# Structure of the CCT panel

## Cross-Cutting Technology Panel

Focus Group 1: District Heating and Cooling for large scale integration of RES

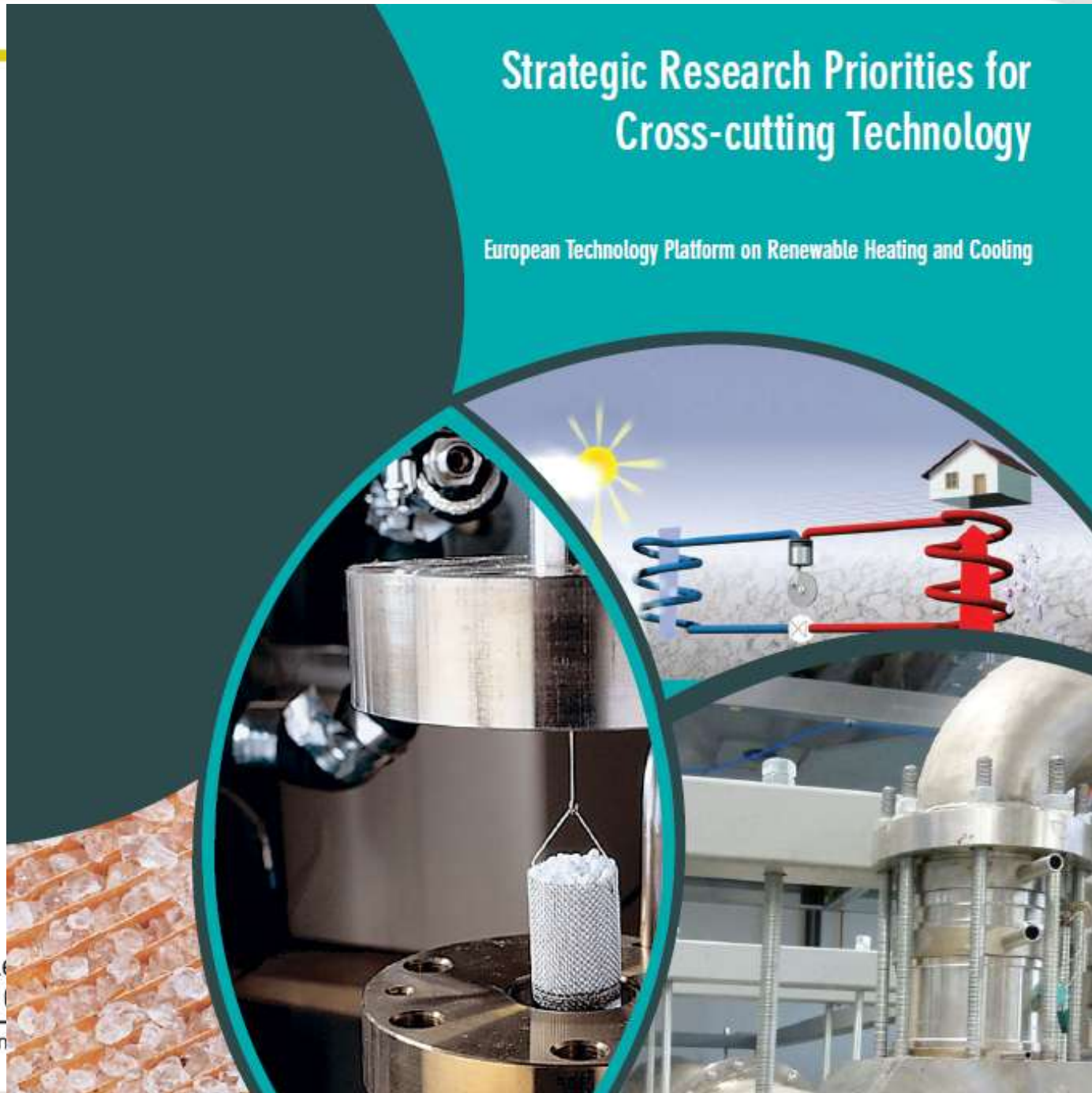
Focus Group 2: Thermal Energy Storage

Focus Group 3: Hybrid Systems and Heat Pumps

# Strategic Research Priorities for Cross-cutting Technology

European Technology Platform on Renewable Heating and Cooling

From 5  
concept  
documents to  
one single  
SRA ...





# Overall structure of the document

## Introduction

1. District Heating and Cooling

2. Thermal Energy Storage

3. Heat Pumps

4. Hybrid Systems

5. Enabling research areas (ICT, Materials)

# Thanks to authors for their effort ... ... and especially to the editor

## AUTHORS

Monica Axell – SP Technical Research Institute of Sweden

Marco Bakker – ECN, NL

Alberto Brunialti – SIFRI, IT

Luisa F. Cabeza – Universitat de Lleida, ES

Edoardo Calia – Istituto Superiore Mario Boella, IT

Jose M. Corberan – Universidad Politécnica de Valencia

Robert de Boer – ECN, NL

Nicolas Fevrier – Euroheat & Power, EU

Angelo Freni – ITAE-CNR, IT

Sabine Froning – Euroheat & Power, EU

Philip Griffiths – University of Ulster, UK

Jean-Christophe Hadorn – Base Consultants, CH

Uli Jakob – Green Chiller Verband für Sorptionskälte e.V., DE

Simone Landolina – European Renewable Energy Research Centres Agency, EU

Per Lundqvist – The Royal Institute of Technology, SE

Michael Monsberger – Austrian Institute of Technology (AIT), AT

Roger Nordman – SP Technical Research Institute of Sweden, SE

Thomas Nowak – European Heat Pump Association, EU

Thore Oltersdorf – Fraunhofer-ISE, DE

Philippe Papillon – CEA-INES, FR

Xavier Py – PROMES-CNRS / University of Perpignan, FR

Burkhard Sanner – European Geothermal Energy Council, EU

Peter Schossig – Fraunhofer ISE, DE

Wolfram Sparber – EURAC Research, IT

Simon Spoelstra – ECN, NL

Louise Trigg – Linköping University, SE

Martijn van Aarsen – IF Technology, NL

Johan van Bael – VITO, BE

Wim van Helden – Renewable Heat, NL

Sven Werner – Halmstad University, SE

Werner Weiss – AEE INTEC, AT

Felix Ziegler – Technical University Berlin, DE

## EDITOR: SECRETARIAT OF THE RHC-PLATFORM

Simone Landolina – European Renewable Energy Research Centres Agency, EU

Greg Arrowsmith – European Renewable Energy Research Centres Agency, EU

[www.rhc-platform.org](http://www.rhc-platform.org)



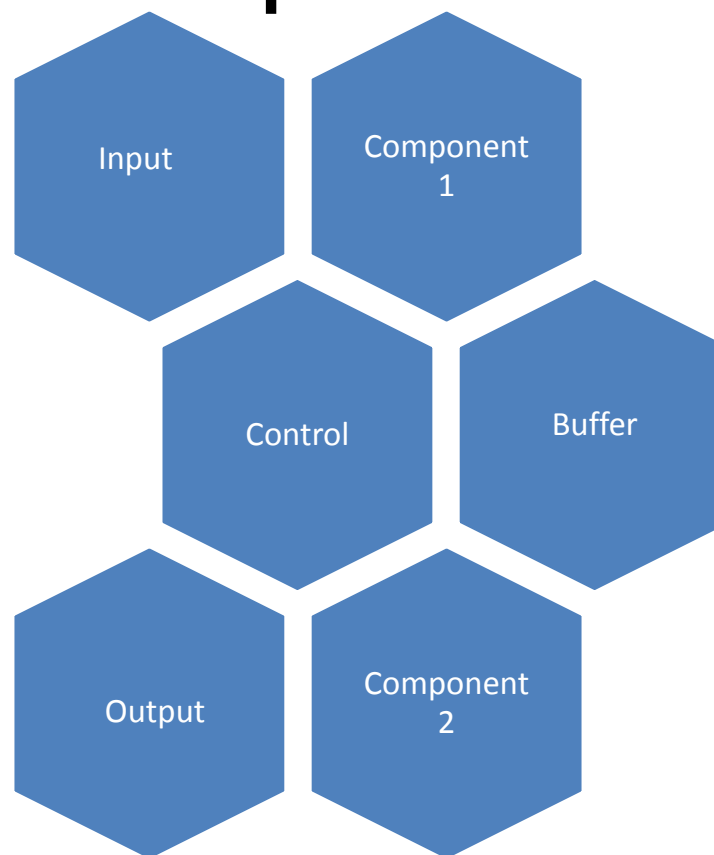
# Hybrid Systems ...

... the combination of two or more energy sources into one single system



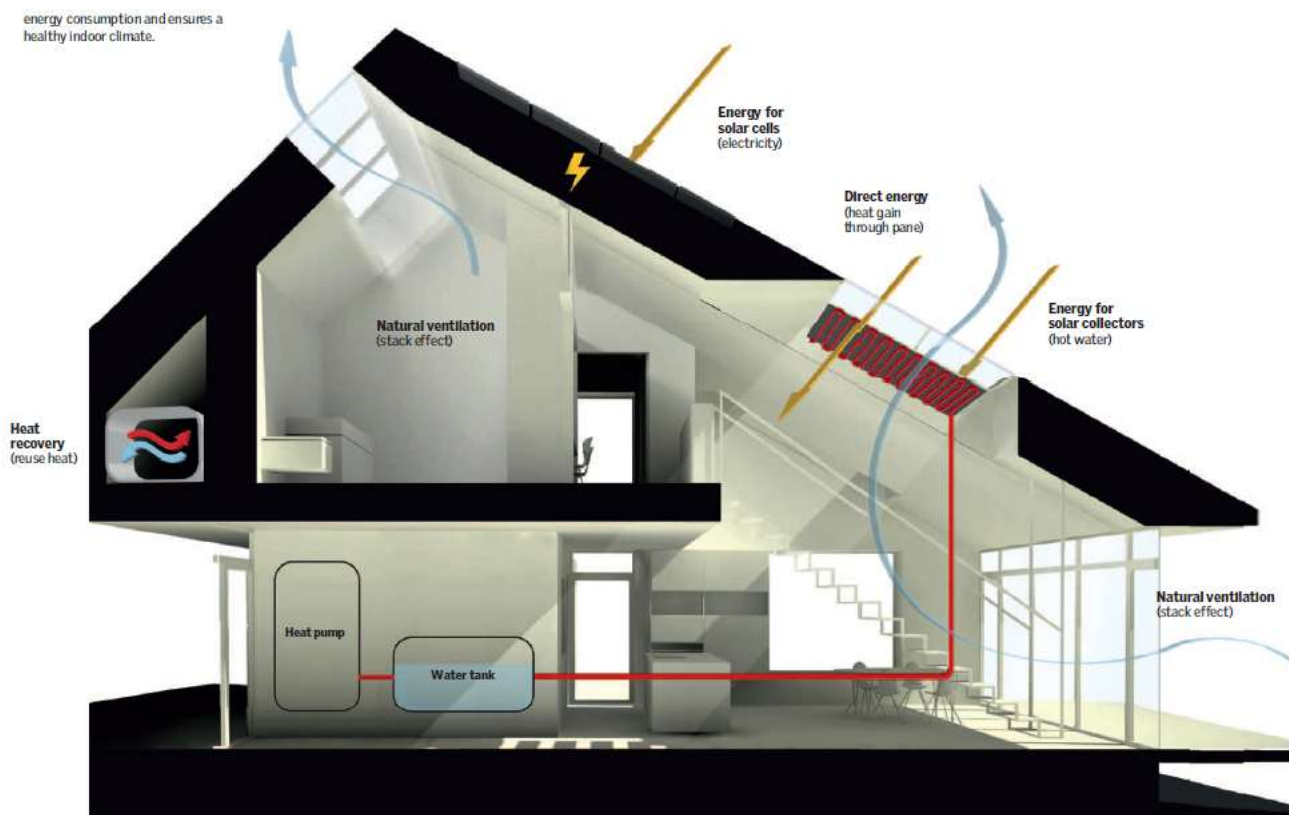
# Small systems ... highly integrated and prefabricated

- Plug and play
- Fast to install
- Highly integrated
- Reliably
- Optimized hydraulics and control



# Small systems ... the building as an energy system

- Multifunctional components for new buildings and strong refurbishments
- Optimized integration of passive and active components and control





# Small systems ...

## New standards and testing procedures

- The efficiency of a systems depends on the components ... but as well on system design, hydraulics, control, ...
- Standards for - and testing of - whole systems



# Large systems ... development of tools for

- decision making
- optimal selection
- simulation and design
- advanced monitoring

4 dimensional information  
sets of energy demand  
and supply in urban areas



# Interaction of hybrid solutions with smart grids – thermal and electrical

- Integration with thermal and electrical grids
- Load management load shifting, peak shaving





# Advanced automation and control

- Supervision of complete system, adaptive control, reduction of auxiliary energy need
- Intuitive user interfaces
- Load forecast based on learning of occupants behavior and weather forecast



Source: Apple

---

# Thank you for your attention

Your are welcome to cooperate in the  
**Cross Cutting Technology Panel**  
=> [www.rhc-platform.org](http://www.rhc-platform.org)



Wolfram Sparber, EURAC research - Italy  
Vice President RHC ETP  
Annual Conference, Copenhagen 2012